Alberta
Advanced Education and Technology
Alberta Science & Research Investments Program
Research Outcomes
2006
Annual Report
OCTOBER, 2007

ASRIP Annual Report 2006

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Alberta Science & Research Investments

New Information & Technology

The Alberta Science and Research Investments Program (ASRIP) has been an active participant in the funding of research infrastructure at Alberta universities since 2000. The ASRIP provides research infrastructure as a tool to attract the best and brightest researchers in an effort to foster innovation and diversify Alberta's economy.

The ASRIP coordinates with Alberta's research institutes and foundations to ensure that capacity is built within Alberta's strategic research areas and that small and large equipment investments complement other targeted provincial funding.

Excellent researchers are key attractants to major industries and a critical factor in developing, attracting and retaining successful new companies.

The ASRIP focuses investment in the areas of energy, life sciences, and information and communications technology (ICT). Alberta's research system is strategically enhanced and well-positioned to recruit and retain excellent people—the scientists, technicians, graduate students and emerging entrepreneurs that are integral to unleashing innovation.

The ASRIP also serves as an important mechanism for leveraging funds from the federal Canada Foundation for Innovation (CFI), the private sector and other sources in order to maximize the research dollars flowing into Alberta's research priority areas.

The ASRIP's four funding streams are:

Infrastructure Sustainability (IS): supports proposals that build on and enhance already successful and productive initiatives supported by past ASRIP and/or CFI investments.

Research Infrastructure (RI): focuses on supporting initiatives that provide new research capacity in Alberta.

Platform Technology (PT): focuses on supporting initiatives that provide cross cutting technology for investigators in diverse areas of research.

Enabling Research Application and Technology Transfer (ERATT): supported operating and infrastructure costs to enhance Alberta's capacity to capitalize on the benefits of research and/or build linkages between industry and academic research.

As this outcomes report illustrates, the ASRIP investments have supported successes in providing world-class research infrastructure to build capacity and help Alberta's research intensive institutions recruit and retain top quality researchers and leverage research funding.

University of Calgary kinesiology researcher Walter Herzog is a leader in both basic and applied research relating to human neuro musculo - skeletal health and well-being.

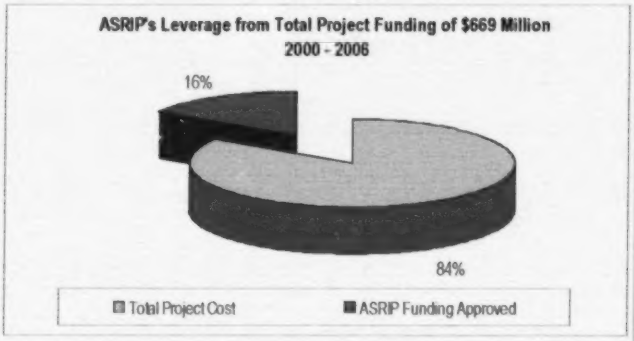
Research Outcomes

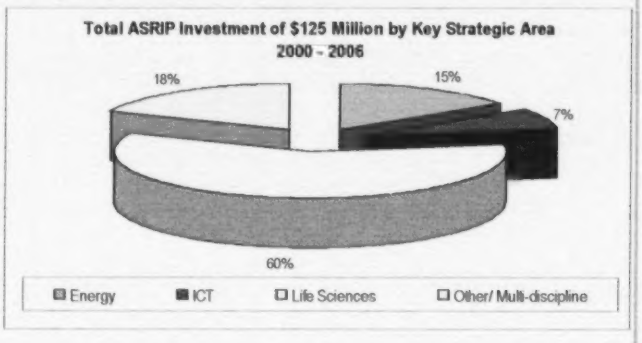
The Alberta Science and Research Investments Program (ASRIP) ran four competitions between 2000 and 2006. During this period, the ASRIP strategically invested over $125 million in 90 infrastructure projects that have significantly increased the research capacity in Alberta. The total value of these projects was nearly $669 million with the remainder of the funding coming from the federal government, the private sector, and non-profit sources.

In that time, the program has implemented the Advanced Education & Technology (AE&T) business plan strategy "to provide strategically targeted support for Alberta university research infrastructure." The ASRIP is the only major program within the Ministry that provides funding dedicated specifically to research infrastructure and, as such, it is an essential vehicle for universities seeking to acquire critical equipment needed to undertake innovative, leading edge research. The research infrastructure funded through previous competitions has been instrumental in launching or sustaining areas of research excellence and assisting in the recruitment and retention efforts at Alberta universities.

The ASRIP has invested in three targeted research areas: ***Life Sciences*** ($74.3 million), ***Information and Communications Technology*** ($8.8 million), ***Energy*** ($19 million), while supporting ***multi-disciplinary projects*** that cross these areas of priority ($22.9 million). Multi-disciplinary projects have impacted climate change/environment, nanotechnology, engineering and social sciences.

After seven years of investments, the ASRIP has had a very significant impact on the larger research community. ASRIP has promoted research quality, fostered innovation, and supported initiatives of strategic benefit to Alberta. The ASRIP has supported research initiatives that have gained national and international recognition and contributed to Alberta through training a highly qualified workforce, providing new knowledge that leads to new company development and the development of treatments and diagnoses for improved health outcomes.





This report presents highlights of selected research outcomes. A complete listing of all the ASRIP infrastructure projects funded from 2000 to 2006 is detailed on page 17.

For more information on building research capacity in Alberta, please visit the AE&T website at www.technology.gov.ab.ca

Facts

- Oil sands industry expansion is a major driver of economic activity in Alberta. In 2006, the ASRIP awarded $6 million for equipment to study increased efficiency of oil sands recovery.
- Alberta is home to one of the world's most technologically advanced research facilities. The National Institute for Nanotechnology (NINT) located at the University of Alberta focuses on finding ways to engineer molecules that are 50,000 times smaller than a human hair.

Dr. Neil Adames' interest is the regulation of cell division and nuclear migration defects which can lead to diseases such as cancer.

Spindle Position and Checkpoint Control During Mitosis

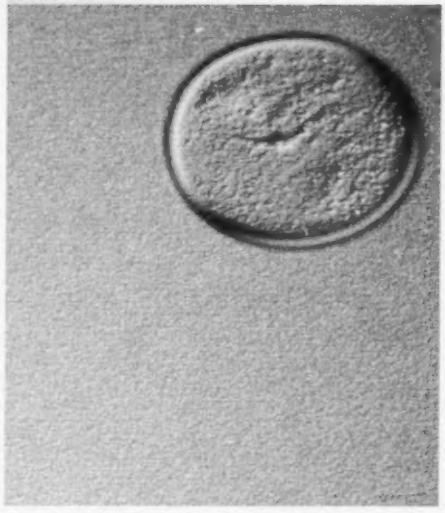
Before cells divide, chromosomes, the cell's genetic material, are duplicated and partitioned evenly between two daughter cells. Dr. Adames' lab studies how this process is coordinated. In particular, researchers study the localization and movements of proteins in living cells using an automated confocal fluorescence microscope to make high resolution movies. The techniques used require the tools of molecular cell biology, such as centrifuges, liquid chromatography, electrophoresis, and microscopy.

Basic biomedical research such as this benefits the economy and the quality of health care by training health, pharmaceutical and biotechnology researchers. Moreover, to understand the causes of diseases such as cancer, scientists need to know what molecules control cell division. The research is a key step in the development of new disease diagnostics and therapies.

The research done by Dr. Adames will provide researchers conducting translational and clinical research a clearer understanding of cell function, thus revealing mechanisms for normal and disease-associated cellular processes.

Dr. Adames' students are acquiring cutting-edge skills through training in molecular genetics, genomics, proteomics and microscopy technologies. These skills are in high demand in many research settings. The training of the first cohort of graduate students is reaching completion. Many undergraduate students who have trained in the lab, have gone on to medical school, veterinary medicine, are completing graduate work in other research labs, or are working in public health policy. The scientists trained in Dr. Adames' lab will contribute to the growth of bio-technology research in both the private and public sectors of Alberta and Canada.

The equipment provided by the ASRIP grant is used by Dr. Adames and is shared with others in his department. The equipment has been an encouragement to at least two new appointments to the Biological Sciences Department, both of whom have garnered prestigious Canada Research Chair positions.



Institution: University of Alberta

Funding Partners: Canada Foundation for Innovation, University of Alberta

ASRIP Funding: $212,088

Total Project Cost: $530,220

Visit the Adames Lab for more information.

Dr. Paul Sorenson's research interests include software engineering, software quality, software reuse and software product line development.

Facility for Study of Effectiveness of Collaborative, Distributed Software Development

As software becomes more sophisticated, so, too has the complexity of its development. This has led to an increasing demand for specialized developers - and a subsequent increase in their scarcity and work location demands. To meet these conditions, Canadian companies are beginning to employ distributed software engineering development.

Distrubuted software development is the process of enhancing and designing software when teams of individuals are geographically separated. The studies range from team social behaviour, and interactions between teams separated by time and space to improvements in international understanding and collaboration among groups working in different countries and cultures. As a result of these studies, high-quality audio-visual communication tools greatly enhance distributed collaborative software development and communication between teams who may be situated around the world.

The infrastructure obtained through the ASRIP grant, enables empirical research on distributed processes, and a collaborative effort involving industry and two university research teams, which incorporate technical and social science disciplines. Dr. Sorenson's research strengthens software development practices of Canadian companies, and supports the international reputations of software research at the universities of Alberta and Calgary.

The lab is one of the best equipped for software collaborative development in Canada. It allows distributed development involving either individuals or teams. The capacity to log development activities in real-time for later playback and analysis and consider data from software engineering practices such as engineering requirements and extensive testing enable analysis by an IBM P-670 parallel computer server with large data storage capacity. The Diversity Lab provides a wide variety of systems for exploration of software development tools and environments running on Linux, Windows XP, and Mac OS using IBM, SUN, Intel and MacIntosh platforms.

In addition, the infrastructure has provided significant training opportunities to graduate students in computing science and companies working on the development of collaboration software projects.

The infrastructure has supported collaboration between institutions (University of Alberta and University of Calgary) and between the University of Alberta and the University of Groningen in the Netherlands in the study of distributed collaborative software engineering. Researchers have also participated with two software companies, net-linx (www.net-linx.com) and Onware (www.onware.ca), on distributed software development trials.

Institution: University of Alberta

Funding Partners: Canada Foundation for Innovation, Sun Microsystems

ASRIP Funding: $546,350

Total Project Cost: $1,654,174

Visit the Paul Sorenson Webpage for more information.

Dr. John Archibald's research concerns the acquisition of first languages by children and the acquisition of second languages by adults.

Language Research Facility

The Language Research Centre (LRC) undertakes advanced research into language learning and teaching and the effective use of language technologies. The facility is multi-disciplinary, sponsored by the University of Calgary's Faculties of Humanities, Social Science and Education. The LRC is a hub of language-related activity that optimizes the intellectual resources from many campus departments and has attracted international participation. It provides a central point of contact on language research between the University of Calgary and the community, the Kindergarten to Grade 12 education system, and the Alberta government. In addition to its research, the LRC offers professional development opportunities for language teachers, advises the provincial government on language policy, and, through its four instructional laboratories, enables the modern language departments at the University of Calgary to deliver language instruction in state-of-the-art facilities.

The Language Research Centre has become a focal point for "Language, Learning and Literacy", one of the University of Calgary's strategic research areas. It has also become a major factor in recruitment among relevant departments in the Faculties of Humanities, Social Science, and Education and the centre for a variety of research projects in the area of language learning and pedagogy. Six international researchers and one post doctoral fellow were recruited to the University of Calgary, in part, due to the available infrastructure. The facility has proved invaluable in providing current graduate students with training on diverse state-of-the-art technology in the area of language learning and has the potential to attract a large number of graduate students in the future.

Researchers associated with the Language Research Centre have played diverse, significant, and ongoing roles in the development of the Languages Initiative launched by the Government of Alberta. The resulting research will have a direct impact on the teaching programs of the university.

The advancements in research due to the availability of the infrastructure are far-reaching. The facility is used by twenty researchers from the University of Calgary and five researchers from other institutions in Calgary and around the world. The availability of the infrastructure has encouraged multi-disciplinary research, bringing together researchers in second language learning, linguistics, education, informatics, sociology, and psychology.

The establishment of networking links, both across Canada and internationally, gives grounds for optimism about future impacts.

Institution: University of Calgary

Funding Partners: Canada Foundation for Innovation, University of Calgary

ASRIP Funding: $430,000

Total Project Cost: $1,077,750

Visit the Language Research Centre for more information.

Dr. Eugene F. Milone oversaw the restoration of the research infrastructure of the Rothney Astrophysical Observatory. Enhanced education, research communications, and science awareness programs have resulted.

Upgrade for the Rothney Astrophysical Observatory

The research infrastructure upgrade of the Rothney Astrophysical Observatory (RAO) converted the Baker-Nunn Satellite Tracking Camera into a Patrol Camera for the discovery of variable stars and asteroids, enabled remote operation of the 0.4 m telescope, and extended the automation of the 1.8 m Alexander R. Cross Telescope.

The RAO is one of only a small number of observatories that have both a patrol camera and telescopes capable of providing follow up optical and infrared photometry. To date, three dozen variable stars in the range of 12 to 16 magnitudes have been detected.

The Baker-Nunn Patrol Camera (BNPC) is used to search for eclipsing, pulsating, and eruptive variable stars, including novae, supernovae, after-glow events of gamma-ray bursters, and even extra-solar planets transiting stars. It is also used to discover asteroids and comets. The astrophysical distribution and physical properties of stars and planets can reveal aspects of the origin and extent of the solar system and the threats posed by near-Earth objects.

An improved set of infrared telescope filters (developed and tested at the University of Calgary), allows cool, red objects to be studied with high precision. This information will contribute to the understanding of the fundamental properties of stars.

Over the past two years, this infrastructure has provided training opportunities for graduate and undergraduate students in the department of Physics and Astronomy. It has permitted training of several undergraduate astrophysics majors and at least two graduate students. The new image processing software has been developed through the Geology & Geophysics and Physics & Astronomy departments providing valuable training experience in data reduction techniques, which are essential for the analysis of large volumes of data generated from astronomical surveys.

The telescopes also provide outreach training for other students through remote observations. Currently, classes of about 10 students are introduced to the telescopes and receive some training in their use, while between two and four people per year are thoroughly trained.

The research infrastructure has increased the effectiveness of the RAO as a research teaching and outreach facility. It contributes to developing a technically capable and scientifically aware work force that both the province and the country requires for the foreseeable future.

Institution: University of Calgary

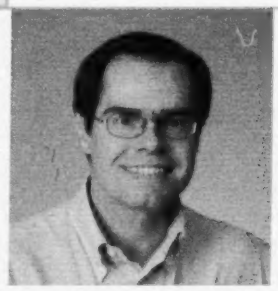
Funding Partners: Canada Foundation for Innovation, University of Calgary, various corporations and firms

ASRIP Funding: $175,000

Total Project Cost: $552,000

Visit the Eugene F. Milone Webpage for more information.

Dr. Neil Duncan is an orthopaedic bioengineer. His interests are: cell biomechanics and mechanotransduction; tissue engineering; and low back pain and osteoarthritis.



Cellular Mechanobiology and Surgical Simulation in Orthopaedic Bioengineering

Biomedical Engineering merges biology, kinesiology, medicine, and engineering. The research attempts to bridge the fields of engineering and biology by understanding how mechanical loads and pressure are sensed by connective tissue cells. It allows researchers to ask very specific mechanistic questions that are essential to advanced understanding and treatment of orthopaedic disorders. The nature of these diseases demands an integration of biology and engineering with medicine. The acquired infrastructure directly furthers researchers' ability to ask these cross-disciplinary questions.

The research program is directed at improving the understanding of two common orthopaedic disorders, low back pain and osteoarthritis, which have a tremendous medical impact on the population. This fundamental research will impact the development of biomaterials and tissue engineered constructs and haptic surgical simulators in biomedical engineering. In the first project, the goals were primarily driven to improve the understanding of the role of mechanical factors in orthopaedic disorders - basic knowledge which is key to developing appropriate biomaterial scaffolds for tissue engineering. In the second project, the goal was to develop a haptic surgical simulator for training orthopaedic surgeons in minimally invasive surgeries. Medical students and surgeons will be able to test their skills using a virtual reality surgical simulator that provides sensitive touch feedback along with realistic 3D imagery. Current research is directed at developing haptic tissue models. Ultimately the goal is to develop a product for use in resident training environments which will have a direct benefit on human health.

Two researchers were recruited for this project from the United States. This infrastructure has already helped to recruit and retain two postdoctoral fellows and two graduate students.

The University of Calgary has tremendous resources available for orthopaedic research in medicine, kinesiology and engineering, making it arguably the best in Canada and competitive internationally. The equipment acquired with this grant has enabled the team to further expand the complement of equipment available to researchers and trainees. The equipment is housed in shared facilities and is available to a wide range of researchers. This availability creates a facility attractive for recruitment and retention in the field. The infrastructure acquired provides the world-class facilities for orthopaedic biomedical engineering that are required to bring researchers from a broad range of backgrounds to tackle inter-disciplinary problems.

The ASRIP funded equipment has helped to advance the integration of basic science research on the cell and tissue mechanobiology into new clinical treatments in tissue engineering and the training of procedures in minimally invasive surgery.

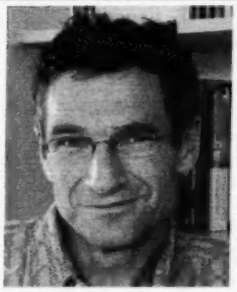
Institution: University of Calgary

Funding Partners: Canada Foundation for Innovation, Alberta Heritage Foundation for Medical Research

ASRIP Funding: $125,000

Total Project Cost: $428,897

Visit the Neil Duncan Webpage for more information.



Kinesiology researcher Dr. Walter Herzog is focused on the neuromechanics of the musculoskeletal system. His expertise is in the area of growth, healing, and adaptation of ligament, tendon, muscle, articular cartilage and bone tissues.

Molecular and Cellular Biomechanics and Biomedical Engineering

This project is focused on molecular and cellular biomechanics. The research team is investigating the structural, mechanical, and biological properties of the cells in musculoskeletal tissues, such as muscle, tendon, and articular cartilage. The work has provided invaluable insight into injuries and diseases such as osteoarthritis, osteoporosis, and muscular dystrophy. As a result, Dr. Herzog's research has made Alberta a leader in the area of musculoskeletal biomechanics.

One component of this work is to understand how muscle cells produce force and how structures in the cells contribute to that force. A second area is to further understand how cells communicate and adapt to mechanical loading or injury. Investigation of gene and mRNA expression as well as protein production, provides insight into how tissues adapt and are maintained in a healthy condition.

The infrastructure acquired, combined with existing equipment and facilities, allows for biomechanical research on musculoskeletal tissues from the single protein level to research on humans and patient populations. Such a broad approach to muscle research is presently not matched anywhere.

Because of the infrastructure support, researchers now have a unique Canadian laboratory for molecular and cellular biomechanics, which has allowed the team to do some very unique work. In turn, these events have triggered a great response from prospective trainees, students, and post-doctoral fellows. Dr. Herzog has been able to attract excellent trainees who are excited about the facility and state-of-the-art equipment. The research group consists of 5 research assistants/technicians, about 12-15 students, and 5-8 post-doctoral trainees and visiting professors. It is expected the infrastructure will be able to address the immediate research needs for about 5-6 years, however the equipment is so fully utilized that the requests from the research team cannot always be accommodated. All but one member of the skilled personnel team has been retained. Attempts to extend the use of the infrastructure through upgrade will be made as required from regular operating and equipment grants.

The infrastructure has strengthened multi-disciplinary research with researchers from Medicine, Science, and Engineering. Specifically, Herzog and his research team have developed and strengthened ties in the area of joint injury and arthritis research, as well as protein biomechanics. Furthermore, they have established new ties with researchers and trainees from laser physics, and have started new collaborations on bone biomechanics, specifically as it relates to osteoporosis and osteopenia.

Several crucial international collaborations are directly dependent on the ASRIP infrastructure, including relationships with the University of Washington, Stanford University, and the National Institutes of Health. The awards and recognition this research gained was in part due to the infrastructure available. A total of 17 scientific refereed papers were published this past year. Dr. Herzog was awarded the Borelli Award from the American Society of Biomechanics and the Career Award from the Canadian Society for Biomechanics, the two most prestigious awards from both Societies.

Institution: University of Calgary

Funding Partners: Canada Foundation for Innovation, Canadian Chiropractic Foundation

ASRIP Funding: $123,078

Total Project Cost: $315,586

Visit the Walter Hertzog Webpage for more information.

Dr. Carey Williamson holds an iCORE Professorship in "Broadband Wireless Networks, Protocols, Applications, and Performance", and an NSERC/iCORE/TELUS Mobility Industrial Research Chair in "Wireless Internet Traffic Modelling".

Experimental Laboratory for Internet Systems and Applications (ELISA)

The Experimental Laboratory for Internet Systems and Applications (ELISA) is a state-of-the-art laboratory for Internet systems research. The ELISA lab provides a geographically-distributed experimental internet testbed shared by researchers at the University of Saskatchewan and the University of Calgary. The combined facilities at both ends enable high-quality experimental computer systems research on the performance evaluation of Internet systems and applications.

The ELISA laboratory facilitates advanced research on Internet systems and applications, including network traffic measurement, workload characterization, web server architecture, video streaming, multicast, multimedia server design, mobile computing, wireless networking, and Internet protocol performance. The equipment in the laboratory includes network traffic analyzers, routers, switches, rack-mounted servers, multiprocessors, Web proxy caches, laptops, PDAs, wireless access points, as well as storage space for the collection and analysis of large-volume network traffic data sets.

The ELISA lab has been a wonderful resource for the recruitment and retention of researchers, as well as for the training of highly qualified personnel (HQP). With his Information Circle of Research Excellence (iCORE) funding at the University of Calgary, Dr. Willamson has been able to build and lead a large research team (15-18 people), including 3 faculty members, 4-6 full-time research staff, and 8-10 graduate students.

The quality of graduate students is high. About 50% of the students in the research group hold prestigious external scholarships, including Natural Sciences and Engineering Research Council Postgraduate Scholarships & Canada Graduate Scholarships, Alberta Ingenuity Awards, and iCORE support. To date, every student in the team has authored or co-authored at least one conference or journal publication related to their graduate work.

Graduate students benefit greatly from a state-of-the-art lab. The resources in the lab provide students with advanced training on performance evaluation and experimental methodologies related to internet systems and applications. In the past five years, 10 M.Sc. students have successfully completed their work under Dr. Williamson's supervision, with seven of these now employed in the ICT sector in Canada, and three more continuing into Ph.D. studies.

Dr. Willamson is currently supervising five Ph.D. students and three M.Sc. students. A team of this size would not be possible without the ASRIP funding providing a suitable lab in which to carry out the research.

As a result of the research, five intellectual property disclosures have been filed with University Technologies Inc. (UTI) at the University of Calgary. These include the team's work on Wireless Web Servers, Web Server Scheduling, Bidirectional MAC Protocols, Multi-Channel MAC Protocols, and Anonymous Network Communication.

Institution: University of Calgary

Funding Partners: Canada Foundation for Innovation, University of Calgary, University of Saskatchewan

ASRIP Funding: $605,000

Total Project Cost: $3,078,704

Visit the Carey Williamson Webpage for more information.

Dr. David Naylor is designing remote sensing spectrometers for environmental monitoring such as pollution in rivers, crop management and city planning. The technology can also be used to study quasars, galaxies and the chemical constitution of stars.

Advanced Infrared Physics Laboratory

Dr. Naylor is a world renowned astronomer, involved for many years with the European Space Agency and the James Clerk Maxwell Telescope (JCMT) in Hawaii. Dr. Naylor uses the JCMT, which is a submillimeter (or far infrared) telescope that observes at wavelengths well beyond the limit of human vision. The world's largest radio telescope, the JCMT is funded by a partnership between the United Kingdom, Canada, and the Netherlands.

The infrastructure provided by the ASRIP has provided test and diagnostic equipment for a laboratory dedicated to the development of infrared radiometers and spectrometers used in astronomical and aeronomical studies at the University of Lethbridge. Potentially, all areas of astronomy will benefit from the increased resolution provided by measurements at infrared wavelengths. This includes studies of the solar system and surveys of protostellar complexes in the Milky Way, and answering key questions about the formation and evolution of galaxies in the early universe.

The infrastructure is also used in collaboration with The Cardiff group, one of the world's leaders in submillimetre technologies. Millimetre and submillimeter-wave observations provide important information for the studies of atmospheric chemistry and of astrochemistry (molecular clouds, stars formation, galactic study, comets and cosmology).

The infrastructure has enhanced opportunities for collaborative research across organizations. There have been intra-institutional and government collaborations as well as collaborations with institutions from outside of Canada. This infrastructure has accelerated the development of existing projects and allowed the researchers to pursue exciting new projects as they emerged.

The availability of the infrastructure has played an important role in the Naylor research team's ability to participate in three major international projects, and has led to a rapid expansion of the group by attracting researchers, students and undergraduate students. Since receiving the ASRIP grant, the group has grown from three to 25 people including postdoctoral fellows, project managers, technicians, graduate, undergraduate and co-op students. Each receives training in a vibrant hi-tech environment and many have found full-time employment in positions which require their highly skilled training.

Institution: University of Lethbridge

Funding Partners: Canada Foundation for Innovation, University of Lethbridge

ASRIP Funding: $79,000

Total Project Cost: $197,500

Visit the David Naylor Webpage for more information.

Dr. James Love's research is related to environmental control systems and computer applications. Sustainability in building, particularly reduction of fossil fuel requirements, has been a continuing interest.

Energy Efficiency Innovations for Buildings

The infrastructure provided by the ASRIP grant determined the effective operating specifications for new technologies including chilled slabs, seasonal passive ventilation, and innovative window blinds for new building designs.

To investigate whether radiant cooling systems and hybrid passive-active ventilation provides efficient operation, simulation and field measurements were used to investigate energy performance and thermal conditions at three sites. One building was the Prairieview School in Vulcan, completed in May, 2005, which incorporates a radiant slab heating and cooling system. The design received an energy-efficiency incentive grant under Natural Resources Canada's Commercial Building Incentive Program (CBIP). A CBIP independent review showed that the design was 57% more efficient than earlier construction techniques. This was achieved with standard Alberta Infrastructure school funding.

Rather than a hybrid passive-active ventilation system, a "displacement" ventilation system was used. This is believed to be the first such installation in western Canada. Displacement ventilation is an air distribution system in which air is supplied near floor level (instead of overhead) and rises to exhaust outlets at the ceiling. Combining this with radiant thermal control means that much less air needs to be moved (the ventilation system can be limited to the outdoor air requirement). From web and literature searches, it is believed that this is the first building in North America constructed with this combination of systems. Two other schools were also fitted with similar ventilation systems in Calmar and Okotoks. Temperature control is via conventional high-temperature perimeter radiation rather than low-temperature radiant control.

A paper, "Radiant slab cooling: a field study of occupant thermal comfort", written by Dr. Zhen Tian and Dr. Love, was accepted for the Simbuild 2006 Conference at the Massachusetts Institute of Technology (MIT). The research tested the assertion stated in the literature that radiant thermal control systems provide comfort under a wider range of air temperatures than systems traditionally used, which would allow for additional energy savings. This was tested with measurements and occupant surveys in workstations with radiant slab cooling. The result allows a more realistic assessment of radiant thermal control systems in terms of energy performance.

Institution: University of Calgary

Funding Partners: Natural Resources Canada, Natural Sciences and Engineering Research Council, various corporations and firms

ASRIP Funding: $139,200

Total Project Cost: $348,000

Visit the Faculty of Environmental Design Webpage for more information.

Dr. Wael Badawy's research is to improve video processing for a wide range of applications. He is currently developing algorithms that will allow video signals to be more efficiently compressed.

A Video Streaming Platform for Wireless Applications

If you've ever seen a lonely outdoor surveillance camera – weathering Canada's harsh winter weather, you may have marvelled at the technology that keeps them working through such adverse conditions.

The truth is, much of the current technology falls far short of the market needs for this equipment. The research and development resulting from this project is making equipment smarter for the intelligent outdoor surveillance market. Dr. Badawy's research refines the technology through mathematical algorithms and new software architecture that will more accurately and reliably detect events – eliminating the common problems of equipment failure and inaccurate detection.

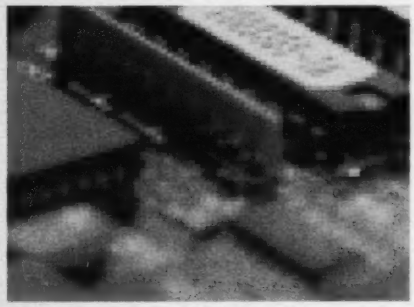
The purpose of this project was to develop a new video streaming platform for low bit rate video applications. The platform prototypes an innovative video coding framework for applications in wireless video surveillance, wireless video conferencing and wireless distance learning applications with GPS capabilities.

The major success of this project is the spin-off Smart Camera Technologies Inc. (SCTI). SCTI is currently commercializing the platform that was designed, implemented, and tested in this project.

By demonstrating the developed platform, SCTI was able to attract investments from: University Technologies International (UTI Calgary); Toronto MicroElectronics (TME); Calgary Health Trust (Calgary); and SOFAB Safety & Security Systems (Saudi Arabia) to invest in Smart Camera development to create several products for safety and surveillance applications. SCTI was able to create 14 new positions in the first two years of operations and attract investment to Alberta.

In addition, at least 10 journal and conference papers have been published, two patents have been filed and one trade name has been registered.

At least 11 graduate and undergraduate students have been trained through this project and are currently working in Canadian Industries, including Smart Camera.



Institution: University of Calgary

Funding Partners: Petro Canada, Mycroline, Canadian Microelectronic Corp., Micronet

ASRIP Funding: $175,000

Total Project Cost: $360,081 *Project predates the 2000-06 listing on page 17.

Visit the Dept. of Electrical Engineering Webpage for more information.

Dr. David Sego helped create the facility which is used to prevent pollution and improve the environment by studying the migration processes of hydrocarbons under adverse conditions.

Geotechnical and Geoenvironmental Cold Regions Research Facility

In 2005, Alberta's oil sands were the source of about 58% of the province's total crude oil and equivalent production, or just over 1 million barrels per day of bitumen. With anticipated industry growth, this level of production is anticipated to triple by 2020. If industry is to meet these growth projections, research is required in a number of key areas. The pace of development in the Athabasca Oil Sands area presents new environmental and resource management challenges. Progressive reclamation and sustainable development is a goal for existing operations, and the implications of new processes and tailings management strategies require additional research. The facility also investigates other environmental contaminates. Intensive livestock operations have concerns over manure management and potential adverse effects such as odour, surface and groundwater contamination, and impact on rural drinking water quality.

Tailings and mine reclamation research advances environmental technologies for the entire industry and encourages a multidisciplinary approach to tailings management. Partly as a result of Dr. Sego's earlier work at the facility, the University of Alberta Faculty of Engineering, along with Natural Resources Canada, opened the $2.2 million Oil Sands Tailings Research Facility (OSTRF) in 2004. The University of Alberta's Geotechnical and Geoenvironmental Cold Regions Research Facility will be used in conjunction with the Oil Sands Tailings Facility to study the impact of cold environments on tailings management. Both facilities have received funding from the ASRIP.

The University of Alberta also has a comprehensive research plan and program into the fundamentals of thickening oil sands tailings, funded by Syncrude and the Government of Alberta. Utilising a 1 m diameter thickener, the program is one of the core research programs of the Oil Sands Tailings Research Facility. The facility is unique in that it offers different cold room facilities to carry out both cold region material testing and geoenvironmental testing in rooms maintained at a constant temperature over extended periods.

Presently freeze thaw testing of intensive farming waste products to release nutrients and to assist with management of these wastes is being carried out. Controlled gases released from oil sands mature fine tailings experiments are being carried out using similar techniques.

A Natural Sciences and Engineering Research Council Collaborative Research and Development (CRD) Grants project is using equipment to test microbial growth under controlled temperature conditions. It will also be used to study the freezing of solute rich waters in soils to understand the location of unfrozen water within the soil matrix. Ultimately, the results of the research will be used for: efficient tailings management, minimized environmental impact of material handling, prevention of adverse environmental releases, efficient use of water, sustainable landscape, and progressive reclamation techniques.

The development of the Facility has retained and enriched the skills of specialists, technicians, and has provided excellent training resources for postdoctoral fellows and graduate students. The infrastructure is an important factor in recruiting new students to the U of A.

Institution: University of Alberta

Funding Partners: Canada Foundation for Innovation, University of Alberta

ASRIP Funding: $250,000

Total Project Cost: $625,000 *Project predates the 2000-06 listing on page 17.

Visit the David Sego Webpage for more information.

Dr. James (Jay) C. Cross is studying the molecular mechanisms by which stem cells of the early embryo are driven to form organs during development, using molecular biology, biochemical and genetic approaches with transgenic and mutant mice.

Renovations and Expansion of the University's Life Sciences Research Station

The University of Calgary's animal care facilities at the Life Sciences Research Station (LSRS) provides essential facilities for research in many fields, including wound healing, orthopaedics, and biomedical engineering. The research has generated many publications in a variety of journals, including Wound Repair and Regeneration, Burns, Cutaneous Medicine and Surgery, the Journal of Investigative Dermatology, IEEE Transactions on Biomedical Engineering, Physiological Measurements, Obesity Surgery, Medical Engineering and Physics, Journal of Orthopedic Research, Journal of Applied Physiology, and the Journal of Biomechanics.

Between its opening in October 2003 and 2006, the LSRS has been used by 22 trainees at the University of Calgary, including eight M.Sc. students, 10 Ph.D. students and four postdoctoral fellows. These trainees represent the Faculties of Science, Engineering, Kinesiology and Medicine, demonstrating the importance of shared facilities in encouraging collaborative, interdisciplinary interactions. For example, from the Faculty of Medicine alone, trainees at the LSRS come from more than seven departments, including Microbiology and Infectious Diseases, Surgery, Clinical Neurosciences, Oncology, Physiology & Biophysics, Paediatrics, and Biochemistry & Molecular Biology. Of particular note is the importance of the LSRS to the University's new Faculty of Veterinary Medicine, which will accept students in September 2008. According to a survey of researchers who have used the facility, the LSRS infrastructure has been instrumental in the recruitment and retention of a total of 33 highly-qualified personnel, including postdoctoral fellows, graduate students and new and existing faculty.

The LSRS infrastructure has led to new collaborations within the University of Calgary, as well as with other institutions, both nationally and internationally. At the national level, new collaborations have been established with researchers at the Dental School at the University of British Columbia and University of Alberta. Internationally, a new collaboration was established with researchers at the Royal North Shore Hospital in Sydney, Australia. Research collaborations have leveraged funding from the private sector and international agencies.

This has led to new partnerships with both small US biotech companies and multinationals (e.g., Smith & Nephew, Cook Engineering). A continued partnership between the University of Calgary's Experimental Imaging Centre and the National Research Council Institute of Biodiagnostics West has enabled the production and installation of the 0.2 T MRI. In the area of biomedical engineering, a partnership with St. Jude Medical in California (USA) has been established. Research results based on use of the LSRS include two patents with the Right-of-First-Refusal from St. Jude Medical in Sylmar, CA. Also, clinical trials have been initiated to test a new method for functional gastrointestinal stimulation, important for the treatment of obesity, gastroparesis and chronic constipation. Results from the wound healing research are promising and are expected to lead to clinical trials of new approaches to prevent the sequelae of burns, potentially resulting in new treatments for burn patients.

Institution: University of Calgary

Funding Partners: Canada Foundation for Innovation, University of Calgary

ASRIP Funding: $8,000,000

Total Project Cost: $12,951,635 *Project pre-dates the 2000-06 listing on page 17.

Visit the Faculty of Veterinary Medicine Webpage for more information.

Dr. Douglas J. Demetrick's research goal is to define the molecular predictors of cancer treatment response and toxicity in order to directly improve the care of cancer patients.

Translational Molecular Biology Research in Breast Cancer

As a result of this project, a clinico-pathological outcome database of breast cancer patients was established. Approximately 2000 patients were included into two related databases. Currently, this data is being merged into the new Canadian Breast Cancer Foundation-Alberta Provincial Tumor Bank database. The award contributed to the acquisition of equipment for genomic analysis, gene expression analysis, and protein analysis, as well as infrastructure for specimen documentation and storage.

Along with the purchase and establishment of the infrastructure was the construction of the Translational Research Laboratory and Calgary Laboratory Services Molecular Pathology Laboratory, a partnership between Calgary Laboratory Services and the University of Calgary, where the bulk of the infrastructure is located. The equipment has served as a resource for many investigators, and has also served as the seed for the Alberta Cancer Board Histology Facility, the Centre for Mouse Genomics Molecular Morphology Laboratory and the recently established Canadian Breast Cancer Foundation-Alberta Research Tumor Bank (Southern Alberta site).

The infrastructure has been a significant factor in research productivity, collaborations and training since it was established. Several international and national investigators have utilised this infrastructure for their research. Research has been published in peer reviewed journals, including Nature Genetics, Blood, Human Gene Therapy, Journal of Molecular Biology, Human Pathology and many others. A reasonable estimate would attribute over 100 publications or abstracts to the availability of this infrastructure for local and international researchers. At least six faculty researchers will have improved their research expertise and broadened their collaborative horizons based on the availability of this investment. More than 50 students, medical residents, and postdoctoral fellows have improved their training based on the availability of this infrastructure. This infrastructure serves as a core resource to support the Calgary site for the successful Canadian Institutes of Health Research - Alberta Cancer Board's *Strategic Training in Translational Cancer Research Program.* At least five full-time faculty researchers and approximately 50 high quality trainees are estimated to have been recruited or retained, at least in part due to the availability of this infrastructure.

Researchers from diverse disciplines such as microbiology, biochemistry, gastrointestinal (GI) tract studies and clinical neurosciences have utilized this infrastructure. Collaborating investigators who have used this infrastructure are from the University of Alberta, University of British Columbia, Queen's University, McMaster University, and New York University.

A significant partnership was forged with Calgary Laboratory Services (CLS - 100% owned by the Calgary Health Region/Province of Alberta) and the infrastructure was used to provide molecular diagnostic services. This infrastructure has also contributed to the development of diagnostic tests for pathogens. Several collaborative publications in peer reviewed journals and abstracts have resulted from research using this infrastructure in partnership with CLS. The infrastructure has also been used to support cancer research sponsored by Oncolytics, Roche, and other pharmaceutical companies.

Institution: University of Calgary

Funding Partners: Alberta Cancer Foundation, University of Calgary, Calgary Laboratory Services

ASRIP Funding: $525,000
Total Project Cost: $1,832,000

Visit the Douglas J. Demetrick Webpage for more information.

Researcher Dr. Vincent St. Louis focuses on understanding the natural biogeochemical cycling of elements in the environment, and how human activity affects these cycles.

Sources, Deposition and Bioaccumulation of Mercury in Alberta

Recently University of Alberta biologist Dr. St. Louis and his research team began determining why some high and subarctic marine animals and freshwater fishes contain concentrations of monomethyl mercury (an organic and toxic form of mercury) high enough to cause exposure risks to northern peoples consuming them as traditional foods.

Mercury (Hg) is a neurotoxin that can accumulate in organisms and magnify more than a million times through aquatic food chains into fish, causing serious health problems with the fish and humans that consume them. Mercury is released to the atmosphere by coal combustion, and can be transported long distances, deposited and then biologically transformed into methyl mercury. In Alberta, over 80% of electricity is generated by coal burning facilities, indicating that widespread mercury contamination is probable. However, little is known of the extent of contamination or the effects on Alberta ecosystems.

Many recent studies have demonstrated the importance of mercury exchange between the atmosphere and biosphere, and have shown that this exchange is more dynamic than previously hypothesized. Delivery of mercury to most water bodies and terrestrial environments, even in remote Boreal and Arctic ecoregions, is largely by atmospheric deposition.

The ASRIP funding allowed Dr. St. Louis and his research team to develop the University of Alberta Ecosystem Biogeochemistry Facility. In particular, they established a Low-level Mercury Analytical Laboratory with a class 100 clean room, and a facility to measure nutrients in aquatic and terrestrial ecosystems.

The laboratory's analytical capabilities have been fully functional since early 2002. Because of the infrastructure acquired through the Province of Alberta funding, they have been able to address numerous issues related to the global mercury contamination of fishes and other food sources (including in the remote high arctic). As well, the movement of nutrients throughout Alberta watersheds altered by human activities such as logging, fire, and oil and gas exploration is being investigated.

The University of Alberta Low-level Mercury (Hg) Analytical Laboratory has been established as a premier mercury analytical facility both within Canada and internationally. This facility is devoted to leading edge research into the biogeochemistry of mercury, and providing a dynamic environment for the training of highly qualified personnel. In the past year alone, five trainees have substantially enhanced their training by using the facility.

Institution: University of Alberta

Funding Partners: Canada Foundation for Innovation

ASRIP Funding: $305,000

Total Project Cost: $610,000

Visit the Vincent St. Louis Webpage for more information.

Alberta Science And Research Investments Program Research Infrastructure, Infrastructure Sustainability And Platform Technology Streams Project List 2000-2006

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
01-151	Creation of a Research Institute for the Study of Supply Chain Collaboration	An outline supply chain simulation environment within which researchers will engage in collaborative research with the business community. Using broadband technology, the aim is to understand and apply collaboration technology, both within an individual business and business to business.	Dhariwal, Kewal	Athabasca University	$2,423,000	$210,000	Other/ Multi-discipline
01-041	Solid-State Nuclear Magnetic Resonance Facility	A state-of-the-art NMR facility for the investigation of solid materials. This facility will have a major impact on the research programs of several researchers in the physical sciences area and will serve as an important training ground for graduate students.	Wasylishen, Roderick E.	University of Alberta	$1,400,000	$650,000	Other/ Multi-discipline
01-045	Bamfield Marine Station - Infrastructure For Studies In Biodiversity and Bio-environmental Fluid Dynamics	Bamfield marine station will utilize infrastructure to support new research activities in the ecosystem time series and biodiversity studies of Barkley Sound, and bio-environmental fluid dynamics.	Spencer, Andrew N.	University of Alberta	$3,046,755	$300,000	Life Sciences
01-047	Understanding Land Cover Through a Strategic Infrastructure Development	The primary outcome of this proposal is the development of infrastructure that enhances our current abilities to process, store and manipulate extremely large imagery and related data, and data sets linked to provincial, national and international initiatives.	Sanchez-Azofeifa, Arturo	University of Alberta	$898,478	$350,000	Life Sciences
01-048	Precision Ranching	Sustainable landscape and animal management systems. New and emerging technologies will be used to study complex spatial and temporal interactions among fauna, flora, climate, soils, topography and human factors and their response to management options.	Price, Mick A.	University of Alberta	$1,137,300	$350,000	Life Sciences

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
01-049	Meanook Biological Research Station Enhancement Proposal	MBRS is a year-round facility supporting critical research efforts to further the efficient and sustainable management of Canada's Boreal Forest. Will expand the research capabilities of MBRS with the addition of a chemical lab and computing facilities housed in a new building.	Hannon, Susan	University of Alberta	$670,000	$287,500	Life Sciences
01-050	Molecular Characterization of Cancer Cell Populations by Single Cell and Living Cell Analysis	Funds for a laser microdissector and robotic microtweezers to isolate/ manipulate cells or subcellular regions. Multi-user laser-assisted technolgies permit correlation of molecular properties with cell function, morphology and position within a cancer mass - a detailed analysis of fresh human tissue specimens is not otherwise possible.	Pilarski, Linda M.	University of Alberta	$1,782,244	$533,000	Life Sciences
01-055	Geochemical Analytical Facility	The facility will provide chemical analysis for multidisciplinary research on assessment and remediation of contaminated sites. Users from science and engineering will have access to much less expensive analysis for their research projects allowing increased analytical capability for enhanced data gathering.	Donahue, Robert	University of Alberta	$667,100	$295,000	Energy
01-059	Infrastructure for Surface Mining Research Laboratory	Infrastructure and facilities will achieve excellence in surface mining research and attract highly qualified researchers. They will maintain sustainable research programs to advance knowledge and frontiers in mining engineering, with impact on industry, Alberta and Canada.	Szymanski, Jozef	University of Alberta	$2,000,000	$660,000	Energy
01-061	Electronic Data Infrastructure Upgrade	A major upgrade of the networks, servers, and data security systems within the Department of Chemistry. Enhancements include faster networks, larger and faster servers, security systems designed to ensure data integrity.	Horlick, Gary	University of Alberta	$459,079	$200,000	ICT

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
01-063	Campus Alberta Research Data Centres	This project is part of a network of regional Research Data Centres, which will establish, in libraries at the U of A & U of C Research Data Centres, secured access to select confidential data files from Statistics Canada.	Krahn, Harvey	University of Alberta	$1,370,638	$685,316	ICT
01-066 **Project Cancelled**	Network Enabled Smart Robotic Systems	More advantageous deployment of robotics, sensing & network technologies in areas of community health, environment and resources in Alberta demands the need for a laboratory focused on advancing new ways of integrating fundamental research in these areas.	Meng, Max	University of Alberta	$2,029,683	$300,000	ICT
01-070	Whole Body Calorimetry	This initiative will result in development of a whole body calorimetry room at the U of A dedicated to accurate measurement of energy metabolism in humans. The unit will enable researchers to investigate mechanisms of energy utilization throughout the human life cycle and in various disease states.	McCargar, Linda	University of Alberta	$770,000	$350,000	Life Sciences
01-162	Phase I Clinical Trials and Research Unit	Medical unit for in-patient clinical trials and research. Purchases include a monitoring equipment-central station, a network of 16 peripheral physiological monitors, replacement of equipment for processing and storage of blood and samples, and minor renovations.	McBlain, William	University of Alberta and Capital Health Authority	$363,932	$152,500	Life Sciences
01-102	Gene Therapy Initiative - the University of Calgary	Recent advances in biotechnology have made it possible to deliver foreign genes into cells for the treatment of human diseases. The purpose of this project is to establish a GLP/GMP facility that will allow researchers to develop gene therapy.	Wong, C.W.	University of Calgary	$2,366,142	$600,000	Life Sciences
01-105	Nutrition, Genetics and Human Performance	Newly-equipped labs in the Faculty of Kinesiology toward the investigation of genetic risk factors and health status of elite athletes. In collaboration with the Faculty of Medicine, we will share core technologies, enhanced recruitment and scientific interaction on this emerging health science.	Gravel, Roy	University of Calgary	$8,527,202	$3,256,247	Life Sciences

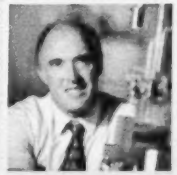
Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
01-111	Multicomponent Seismic Data Acquisition System	A system for time-lapse monitoring of CO2 injection and other acid gases in depleted hydrocarbon reservoirs and deep aquifers in Alberta. Geological sequestration of CO2 is a viable technology for the reduction of greenhouse gas emissions.	Lawton, Don C.	University of Calgary	$3,399,512	$1,160,000	Energy
01-113	Language Research Facility	A facility for psycholinguistic experimentation on second language acquisition in adults and its implications for improvement of technology-enhanced language instruction, for curricular and teacher development, and for general policy issues related to second or heritage languages.	Archibald, John	University of Calgary	$1,077,750	$430,000	Other/ Multi-discipline
01-120	Genetics and Developmental Biology Laboratories	Establishment of the Genes and Development Research Group and the construction of a blend of individual labs without walls and specialized research facilities, (e.g. microsurgery, viral gene transfer, digital imaging). These facilities, coupled with the outstanding investigator group, will enhance Alberta's efforts in gene therapy.	Weiss, Samuel	University of Calgary	$1,066,900	$190,000	Life Sciences
01-123	Integrated Centre for Advanced Materials Characterization	The acquisition of this instrument will serve to further strengthen our interdisciplinary research in areas such as the development of new solids, thin films, and polymers.	Birss, Viola I.	University of Calgary	$1,700,373	$490,000	Other/ Multi-discipline
01-125	Research Capability Upgrade of the Rothney Astrophysical Observatory	Instrument upgrade to remain competitive, train students in cutting edge astronomical instrumentation and observation. Improve infrared imaging through enhanced infrared & optical imaging cameras & controllers, spatial resolution through tip/tilt adaptive optics, improved efficiency through automation of telescopes.	Milone, E.F.	University of Calgary	$552,000	$175,000	Other/ Multi-discipline

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-044	NMR, GC-MS & computational tools to support research programs in chemistry and biochemistry	Core research tools for explaining chemical structures & understanding reaction pathways. Acquisition of spectroscopic, chromatographic, and computational equipment will support research and collaborations with industry and international scientists.	Mahaffy, Peter	King's University College	$665,009	$200,000	ICT
02-043	Advanced infrared physics laboratory	Advanced infrared physics laboratory for the development and calibration of radiometers and spectrometers for remote sensing.	Naylor, David	University of Lethbridge	$197,500	$79,000	Other/ Multi-discipline
02-080	Canadian Centre for Behavioural Neuroscience	Major equipment items include attachments for 500 MHz NMR to allow *in-vitro* imaging of rats and mice, electrophysiological equipment and behavioural equipment.	Kolb, Bryan	University of Lethbridge	$770,780	$272,429	Life Sciences
02-125	The Banff International Research Station for Mathematical Innovation and Discovery (BIRS)	A collaborative Canada-US-Mexico venture to operate an international centre for the mathematical sciences and its applications. Infrastructure is for a computer network and essential renovations to the Banff Centre.	Nutt, Art	The Banff Centre	$1,507,778	$500,000	Other/ Multi-discipline
02-045	Spindle Position and Checkpoint Control During Mitosis	Research into the mechanisms for nuclear and spindle positioning and the signaling pathways controlling cell division.	Adames, Neil	University of Alberta	$530,220.00	$212,088	Life Sciences

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-046	Laboratory for Colloids and Complex Fluids	A laboratory to investigate and control the properties of complex fluids, such that are found in oil sands processing, wastewater treatment, pulp and paper manufacturing and biological fluids.	Bhattacharjee, Subir	University of Alberta	$312,500	125,000	Energy
02-047	High-Capacity Digital Communications Lab	A research laboratory to facilitate design, simulation, implementation and testing of high capacity, high reliability digital communications systems.	Schlegel, Christian	University of Alberta	$312,500	125,000	ICT
02-058	Nanofabrication Facility	The facility will significantly extend the capabilities of the existing open-access Microfab to that of the best in Canada. Enables innovative research in nano-biotechnologies, nanoscience, and nanomaterials in ICT, health, and resource sectors.	Brett, Michael	University of Alberta	$8,247,533	$3,082,460	Other/ Multi-discipline
02-060	Protective Clothing and Equipment Research Facility	An enhanced flash fire simulation / instrumented mannequin facility, and equipment for fundamental material combustion studies, combined heat / mass / moisture transfer studies and ultra-violet protection research.	Crown, Elizabeth	University of Alberta	$1,462,301	$537,462	Other/ Multi-discipline
02-062	Centre for Comparative Psycholinguistics	Enables the multifaceted psycholinguistic study of language representation and processing among speakers of indigenous and minority languages.	Libben, Gary	University of Alberta	$743,685	$297,474	Other/ Multi-discipline

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-066	Westgrid: The Western Canada Research Computing Grid	An integrated system of high-performance computing facilities, data storage capability, collaborative work sites, high-speed networks, and human resources that together provides a unique shared research infrastructure designed for and by research groups across Alberta and British Columbia.	Schaeffer, Jonathan	University of Alberta	$40,571,910	$5,995,420	ICT
02-067	Tailings Research Facility	The facility comprised of delivery, treatment and deposition modules carries out research to develop novel and innovative approaches to treating tailings to reduce the environmental impact of the bitumen extraction.	Sego, David C.	University of Alberta	$2,000,000	$500,000	Energy
02-068	Facility for Study of Effectiveness of Collaborative, Distributed Software Development	To support research on how software can be conceived, developed and maintained collaboratively in distributed locations. Special focus is on heterogeneous development environments, embedded systems, and software product lines.	Sorenson, Paul	University of Alberta	$1,654,174	$546,350	ICT
02-069	High-Field MR for Biological Image-Guided Tomotherapy	A high-field (3T) MR system to develop biological tumor targeting for adaptive tomotherapy, and to study the subsequent metabolic and biochemical treatment effects on tumors and healthy tissues.	Fallone, Gino	University of Alberta	$9,776,300	$3,846,000	Life Sciences
02-083	University of Alberta Heart & Stroke Research Centre	A transnational human vascular biology research facility for the new Alberta Cardiac Institute. It will study the effects of heart attacks and strokes, and houses state-of-the-art cardiovascular imaging tools, basic science core labs, a gene therapy facility and an outcomes research centre.	Archer, Stephen	University of Alberta	$16,613,301	$3,244,910	Life Sciences

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-091	Project CyberCell - Proteomics, Metabonomics and Functional Genomics Experimental Component	To quantitatively determine the dynamic and structural nature of cellular processes in E. coli, with the ultimate goal of recreating the living cell computationally. This is a joint project from the Universities of Alberta, Calgary and Lethbridge.	Weiner, Joel	University of Alberta	$17,454,775	$4,700,000	Life Sciences
02-105	Alberta Centre for Surface Engineering and Science (ACSES)	An integrated facility for surface characterization and modification, supporting interdisciplinary research throughout Alberta. Essential instruments previously not available or not generally accessible within the province are provided.	Ivey, Doug	University of Alberta	$13,163,230	$4,000,000	Energy
02-107	The University of Alberta Protein and Gene Discovery Centre	New technology and facilities for research in high-throughput chemical genetics, genomics and proteomics.	Harrison, D. Jed	University of Alberta	$9,840,289	$1,800,000	Life Sciences
02-108	Modern Infrastructure to Support Inter-disciplinary Water Chemistry in the 21st Century	Research in industrial impacts on environmental and human health. Included are a freshwater biogeochemistry laboratory facility, and three fully gauged and monitored experimental catchments in boreal plains, foothills, and alpine locations in Alberta.	Schindler, David	University of Alberta	$9,630,188	$1,400,000	Life Sciences
02-109	Alberta Cooperative Conservation Research Unit: Infrastructure for Studies in Conservation Science	The Unit functions as a central 'umbrella' for research innovation including biomonitoring, landscape and population modeling, and application of telemetry, GPS, GIS and DNA fingerprinting to resource management.	Samuel, William M.	University of Alberta	$2,483,826	$320,000	Life Sciences
02-121	Ion Beam Laboratory for Nanoscale Materials Processing and Patterning	A combined facility for advanced ion implementation and optical and nanostructural characterization.	Egerton, Raymond	University of Alberta	$661,853	$199,575	Life Sciences

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-088	Creation of the Alberta Diabetes Research Centre (ADRC)	A state-of-the-art multidisciplinary diabetes research facility. This research centre will provide Alberta with the infrastructure and resources needed to maintain and expand its existing diabetes research excellence.	Rajotte, Raymond	University of Alberta	$39,832,358	$6,000,000	Life Sciences
02-090	Centre of Excellence for Viral Hepatitis Research	A multidisciplinary centre which builds and equips new space (13,250 sq ft) including animal facilities, provides equipment for existing laboratories, expands our tissue bank and establishes a node in a national database for viral hepatitis.	Tyrrell, D. Lorne	University of Alberta	$9,264,007	$2,000,000	Life Sciences
02-048	Large Scale Tissue Culture and Bioreactor Facilities for Biomedical and Biochemical Engineering Research	Infrastructure for the Pharmaceutical Production Research Facility including computer controlled bioreactors and fluorescence microscopy equipment.	 Behie, Leo	University of Calgary	$378,830	$151,532	Life Sciences
02-049	Cellular Mechanobiology and Surgical Simulation in Orthopaedic Bioengineering	Research into invertebral disc degeneration and osteoarthritis including tissue engineering and the development of surgical simulations.	Duncan, Neil	University of Calgary	$428,897	$125,000	Life Sciences
02-050	Energy and Imaging	A laboratory where imaging techniques are used as tools to solve chemical and petroleum engineering problems.	Kantzas, Apostolos	University of Calgary	$650,000	$175,000	Energy

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-051	Molecular and Cellular Biomechanics and Biomedical Engineering	Laboratories for molecular and cellular biomechanics and biomedical engineering research. The long-term aim of research in these facilities is to gain an understanding of musculo-skeletal growth, adaptation, healing and ageing.	Herzog, Walter	University of Calgary	$315,586	$123,078	Life Sciences
02-052	Analysis of Gene Regulation and Function Using Transgenic Model Systems	Equipment to expand the ability at the University of Calgary to carry out sophisticated types of phenotype analysis in transgenic animals.	Jirik, Frank	University of Calgary	$317,754	$127,100	Life Sciences
02-053	Medical Genetics Research Laboratory	Meiotic research infrastructure to understand mechanisms that affect the production of chromosomal abnormalities in human gametes.	Martin, Renee	University of Calgary	$313,572	$95,988	Life Sciences
02-054	Cellular / Molecular Biology Core Equipment	Equipment for the new Respiratory Research group initiative on the molecular pathogenesis of inflammatory airway diseases. A major focus will be on defining the mechanisms underlying virally-induced exacerbations leading to asthma.	Proud, David	University of Calgary	$316,894	$125,000	Life Sciences
02-055	Studies on the Cause, Prevention and Cure of Type 1 Diabetes	Research to find the mechanisms involved in the initiation of beta cell specific immune responses and development of methods for the prevention of autoimmune diabetes. Additional plans are to develop a cure for type 1 diabetes by a novel insulin gene therapy.	Yoon, JiWon	University of Calgary	$640,000	$136,000	Life Sciences
02-056	Plant Metabolic Processes Biotechnology	Infrastructure for a laboratory engaged in research on the biochemistry, molecular biology, and biotechnology of plants.	Facchini, Peter	University of Calgary	$372,589	$143,590	Life Sciences

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-057	RHODIUM. A Pentium Computer Ranch for Catalyst Design and Chemical Modeling	A facility to carry out modeling of catalytic processing through assembly of a multi-processing computer.	Ziegler, Tom	University of Calgary	$312,500	$125,000	ICT
02-075	Hybrid Passive-Active Lighting, Ventilation, and Thermal Systems for Commercial and Institutional Buildings	The project is a 200 m^2 full-scale building that would serve as a dedicated testbed for developing and evaluating innovative energy systems for buildings.	Love, James	University of Calgary	$348,000	$139,200	Energy
02-077	Experimental Laboratory for Internet Systems and Applications (ELISA)	The project provides network measurement equipment at the University of Calgary as part of a geographically distributed internet systems testbed shared with the University of Saskatchewan.	Williamson, Carey	University of Calgary	$3,078,704	$605,000	ICT
02-124	ICU CaRES Program	Infrastructure for the acquisition, cataloguing, and storage of human material necessary for the investigation of biological mechanisms of disease.	Winston, Brent W.	University of Calgary	$2,234,249	$165,000	Life Sciences
02-093	Broadband Network Reworking in Support of Bioinformatics and Imaging	Higher bandwidth connectivity is required by the Faculty of Medicine's life sciences researchers, especially those leading the ICT-intensive fields of bioinformatics and imaging, in order to remain competitive at the national and international level.	Sensen, Christoph	University of Calgary	$2,955,955	$800,000	Life Sciences

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
02-096	Centre for Advanced Functional Imaging Studies	The development of a centre that performs molecular imaging. The 9.4 Tesla magnet and a future 10 Tesla magnet permits innovative, advanced research in the use of MR imaging to investigate disease and therapeutics in animal model systems.	Dunn, Jeff	University of Calgary	$23,657,302	$1,800,000	Life Sciences
02-097	Centre for Health and Policy Studies (CHAPS)	CHAPS will improve the health of Albertans and the efficiency of health care delivery in the Province. This innovation brings together core CHAPS disciplines of economics, population health, health policy analysis and health care utilization and involves close collaboration with related disciplines across the whole university.	Noseworthy, Thomas	University of Calgary	$1,656,825	$150,000	Life Sciences
02-098	Integrating Research in Osteoarthritis: From the bedside to the bench and back again	A consortium of musculoskeletal investigators from the faculties of Medicine, Engineering, Kinesiology, and Science, will integrate research efforts into osteoarthritis, a degenerative disease. Equipment will consolidate 4 facilities and 2 core resources to enable the necessary multidisciplinary, translation research.	Hart, David	University of Calgary	$12,710,038	$1,900,000	Life Sciences
02-100	Centre for mouse genetics, physiological systems and disease	Investigators will use genetic approaches in mice to model and understand normal development and disease in humans. They will conduct both high throughput mutation genes and analysis of complex mutant phenotypes, supporting Alberta's important national and international role in functional genomics research.	Cross, James	University of Calgary	$19,356,461	$2,900,000	Life Sciences
02-999	Athabasca University Geophysical Observatory	The geophysical observatory infrastructure consists of instruments, a high capacity data connection to them, and a building to house them.	Connors, Martin	Athabasca University	$294,200	$115,000	Other/ Multi-discipline

Project Number	Project Title	Descriptive Summary	Primary Investigator	Lead Organization	Total Project Cost	ASRIP Funds Approved	Key Strategic Area
04-021	Centre of Excellence for Gastrointestinal Inflammation and Immunity Research	The Centre will support a multi-disciplinary team of medical scientists in examining the environmental, microbial, immunological and genetic factors that cause the gastrointestinal disorders and related cancers that afflict 60 per cent of Canadians in their lifetime.	Fedorak, Richard	University of Alberta	$20,508,807	$4,605,013	Life Sciences
04-031	Cardiovascular Translational Research Centre	An innovative centre to facilitate the development of new therapeutic strategies to improve the outcome of cardiac surgery. The research has a strong translational focus, which will result in research advances being rapidly translated into optimal clinical care for the cardiac patient.	Lopaschuk, Gary	University of Alberta	$14,233,036	$2,500,000	Life Sciences
04-032	Integrated Nanosytems Research Facility	The Facility (INRF) will consist of four components that will encompass fabricating nanomaterials, the self-assembly and synthesis of molecules, nanoscale manipulation and the computing power to model, design and visualize nanosystems.	Lynch, Dean David	University of Alberta	$74,727,796	$4,883,118	Other/ Multi-discipline
04-033	Oil Sands and Coal Interfacial Engineering Facility	A state-of-the-art facility supporting research to develop step-out technologies in oil sands processing, bitumen extraction and upgrading, producing clean energy from coal, environmental impact minimization and improved water utilization. These issues are approached at the micro- and nano-scale and have the potential to revolutionize bitumen extraction and upgrading.	Masliyah, Jacob	University of Alberta	$5,853,787	$1,429,669	Energy

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04-036	Nanophotonics Microscopy Unit	A state-of-the-art laboratory for ultra-fine-scale characterization of fluorescent materials for nanotechnology. Research in this emerging field could lead to many applications in areas related to microphotonics and information technologies in which the special light-emitting properties of nanoscale semiconductors may play an important role.	Meldrum, Al	University of Alberta	$472,294	$152,000	Other/ Multi-discipline
04-037	Agricultural Genomics and Proteomics Centre	The infrastructure will enable the world-class researchers to identify genes and related proteins affecting processes in animal agriculture that are highly relevant to industry, including growth, waste production, and efficient nutrient utilization.	Moore, Stephen	University of Alberta	$3,372,758	$1,100,000	Life Sciences
04-042	Field Facility to Support Ecosystem Management Emulating Natural Disturbances	The research seeks to understand the impact forest harvest has on forest habitats, biodiversity, and forest regeneration in an effort to optimize forest management in relation to costs and long-term benefits.	Spence, John	University of Alberta	$595,028	$223,740	Life Sciences
04-044	Project to Restore Movement	A range of brain stimulation equipment that will place the project at the very forefront of non-invasive study of brain function. The overall goal is to understand the normal control of movements and to use this knowledge to enhance and restore movements to people with motor disabilities resulting from strokes, accidents and other causes.	Stein, Richard	University of Alberta	$4,413,635	$510,600	Life Sciences
04-051 Project Cancelled	Canadian Molecular Cytogenetics Platform: Health Technology Assessment Facility	A national consortium of researchers and clinicians studying the application of advanced molecular cytogenetic technologies. Cytogenics is a unique diagnostic tool that can identify abnormalities in an individual's genome that can cause birth defects, developmental delay, mental retardation, growth abnormalities, infertility, recurrent miscarriages and cancer.	Tomkins, Darrell	University of Alberta	$11,282,309	$47,714	Life Sciences

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04-063	Canadian Pain Trials Network	The goals are to create new therapies, build a national pain database, develop health policies to reduce the incidence of pain, decrease its socioeconomic impact and maximize opportunities for commercialization. The network will coordinate multi-centre clinical trials for the development of novel therapies, and develop an innovative clinical research training program.	Taenzer, Paul	University of Calgary	$55,469	$22,507	Life Sciences
04-067	Institute for Inflammatory Diseases: A common focus for the improvement of health	The Institute brings together the facilities and researchers to develop new strategies for prevention and treatment of inflammatory disease that will lead to improved quality of life and reduced mortality, while marketing drug discoveries and creating knowledge-based jobs.	Kubes, Paul	University of Calgary	18,629,196	$2,009,943	Life Sciences
04-068	Project neuroARM: MR compatible image guided robot for microsurgery	Development of an innovative medical robot system designed to enhance human-guided, robot microsurgery through magnetic resonance image (MRI) guidance, tremor elimination and increased spatial resolution.	Sutherland, Garnette	University of Calgary	$30,000,357	$3,000,000	Life Sciences
04-069	Brain, Behaviour and Cognitive Science Imaging Facility	The expansion of the Canadian Centre for Behavioural Neuroscience (CCBN) will allow researchers to take full advantage of the equipment and collaborations by bringing together researchers from Psychology, Neuroscience, Biology and Biochemistry to tackle the main research themes at the CCBN: spatial cognition and memory, motor control, neurological disorders (e.g., Parkinson's disease, fetal alcohol syndrome, and stroke), drug addiction and brain plasticity.	Kolb, Bryan	University of Lethbridge	$2,865,272	$933,082	Life Sciences

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06-317-RI	Alberta Institute for Viral Immunology (AIVI)	Create biosafe and biosecure environments where innovation research generates insights into how viruses infect cells and cause disease, and how immune defenses provide protection from these agents. The goal is to: (i) build a capacity to respond to and control disease outbreaks with adequate medical and scientific expertise; (ii) invest in public health infrastructure, including research facilities and technology; and (iii) participate in international research efforts on emerging diseases.	Evans, David	University of Alberta	$24,926,384	$6,941,811	Life Sciences
06-320-RI	Alberta Centre for Prions and Protein Folding Diseases (ACPPFD)	The infrastructure will support the research activities into the biological, environmental and societal aspects of prion diseases and other diseases of protein folding. The research will provide insight into how BSE and other diseases of protein folding are initiated, maintained and propagated. Another goal is to develop technology for the detection of BSE, and identify potential drug treatments. The work will also result in the design of safe systems of inactivation and decontamination of prions in the natural environment and laboratories.	Rachubinski, Richard	University of Alberta	$12,137,665	$4,855,066	Life Sciences
06-327-RI	Creation of the Alberta Transplant Applied Genomics Centre (ATAGC)	The Centre will integrate clinical and basic research to characterize the biological basis of transplant disease phenotypes. Establishment of the ATAGC will improve patient care at the centre by integrating shared technologies across transplant organ groups, enhancing teaching and training opportunities, and creating new research opportunities. Combined with the success of the centre's research programs and the development of diagnostics, health benefits will be achieved in Alberta and internationally.	Halloran, Philip	University of Alberta	$12,661,021	$4,134,936	Life Sciences
06-329-RI	Ultrafast Nanotools Laboratory	Infrastructure for a new interdisciplinary research lab dedicated to exploring fast processes in nanomaterials. The experiments from this lab will help researchers understand the nature of nanomaterials and the ultimate switching speed of nanodevices. The infrastructure will give newly formed nano-technology companies in Canada a significant competitive advantage in the emerging market of microwave nanodevices.	Hegmann, Frank	University of Alberta	$3,178,702	$975,000	Other/ Multi-discipline

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06-355-RI	Canadian Centre for Isotopic Microanalysis	The facility will be dedicated to natural resource research and will provide research tools for micrometer-scale isotopic analyses currently not available in Canada. Research on the formation, migration and extraction of hydrocarbon deposits will produce direct benefits for the oil and gas industry by providing fundamental parameters for the modeling of fluid flow in reservoir rocks. Such models are used by industry to determine if extraction of a non-conventional hydrocarbon reservoir is economically feasible.	Stachel, Thomas	University of Alberta	$13,215,959	$4,447,595	Energy
06-365-IS	Nanofabrication Facility Expansion	Equipment additions for the Micromachining and Nanofabrication Facility are driven by the needs of the user base, comprised of industry, government and academic researchers, numbering over 550. With this new infrastructure, the NanoFab will be a top-tier facility for innovation, on par with the very best three or four such laboratories in North America. The open-access operational model of the NanoFab brings together researchers from diverse disciplines, institutions, and companies in one location, leading to enhanced innovation through previously unlikely collaborations, maximizing the opportunities for new research ideas and products.	Brett, Michael	University of Alberta	$5,264,699	$2,062,672	Other/ Multi-discipline
06-350-RI	Gene Silencing and Sequencing Facility	New research capacity for state-of-the-art gene silencing, target identification and therapeutic intervention. The infrastructure will lead to innovative research on: RNA synthesis chemistry, RNA-based therapeutics, cancer treatment, stem-cells, anti-infective drugs and characterization of resistance, prion disease, genetic risk factors, and the immune system. The novel mode of action and high specificity of siRNA reagents offers the promise of a new generation of more effective drugs which will give hope to those afflicted with cancer or other serious diseases.	Pon, Richard T.	University of Calgary	$800,434	$320,174	Life Sciences

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06-367-IS	In-Situ Upgrading: The Next Generation Technology for Canada's World Class, Oil Sands Energy Resources	Infrastructure for the continued development of new in-situ upgrading techniques that utilize ultradispersed nano-catalysts to efficiently extract a medium quality crude oil directly from the earth. The in-situ recovery technologies will reduce natural gas consumption, address environmental concerns and create new value-added products.	Pereira Almao, Pedro	University of Calgary	$23,335,814	$6,026,791	Energy
06-369-IS	Advancing Intraoperative MRI (iMRI)	The infrastructure will upgrade the iMRI system to allow for safer brain surgery and expand imaging capabilities to include surgical guidance and monitoring for the entire body. The new system will allow surgeons to accurately plan the surgical corridor while minimizing trauma to the patient. In addition, the iMRI-assisted surgery, in combination with advanced robotics (neuroArm), neurosurgery and application to other organ systems, is truly innovative. This state-of-the-art integrative infrastructure will attract innovative scientists working towards improved health care and benefit the Canadian healthcare system.	Sutherland, Garnette	University of Calgary	$10,448,367	$4,001,110	Life Sciences
06-371-IS	Laboratory for Imaging Spectroscopy Applications	Infrastructure for a laboratory devoted to the design, construction and calibration of imaging spectrometers for remote sensing applications. The applications of spectral imaging systems are as diverse as astronomical imaging (star formation, galactic evolution), environmental monitoring (pollution in rivers, industrial plants, growth of illegal crops), earth observations from airspace (crop management, city planning), biomedical imaging (cell abnormalities, microscopy) counterfeit detection (money, art) and retinal imaging (security, glaucoma).	Naylor, David	University of Lethbridge	$1,856,900	$742,760	Other/ Multi-discipline

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06-372-IS	Submillimeter Instruments for Astronomy	Infrastructure for the development of far-infrared imaging spectrometers operating at submillimetre wavelengths that is unique in Canada. This national project, involving four institutions and international collaborators, supports the technology development of improved imaging tools to be applied in numerous fields. Dr. Naylor, through the Alberta Centre for Advanced Imaging, will provide a nexus for the research excellence that exists within Alberta in the areas of sensors and instrumentation; algorithms for processing and analyzing spectral image; data and data management, access and distribution.	Naylor, David	University of Lethbridge	$6,772,280	$408,000	Other/ Multi-discipline
06-375-PT	Compute Canada – Alberta	The Compute/Calcul Canada (CC) initiative unites the academic high-performance computing (HPC) organizations in Canada through the collective proposal of the seven regional HPC consortia (which includes the WestGrid consortium for Alberta and the western provinces). The HPC consortia represent over 50 institutions and over one thousand university faculty members doing computationally-based research. The Compute Canada initiative is a coherent and comprehensive proposal to build a shared distributed HPC infrastructure across Canada to meet the needs of the research community and enable leading-edge world competitive research.	Schaeffer, Jonathan	U of A, U of C, U of L, AU, Banff Centre	$59,999,997	$6,750,000	Other/ Multi-discipline
06-348-PT	Synergies: The Canadian Information Network for Research in the Social Sciences and Humanities	Synergies, a cooperative effort amongst 25 universities across Canada, involves the implementation of a new generation of research infrastructure for the social sciences and humanities. The Alberta portion of the integrated national project, Synergies, will use existing platform technologies to increase the impact of electronic dissemination through research into e-journal support, persistent identification, and preservation. The underlying infrastructure consists of a set of networked high-capacity servers, high-performance workstations, and software packages.	Westell, Mary	University of Calgary	$11,446,077	$408,409	Other/ Multi-discipline
				TOTAL:	$668,796,504	$125,000,929	